

NO source in a high mountain site: investigation using a neural network

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The nitrogen oxide (NO) emissions contribute significantly on the air quality, impacting on the tropospheric ozone (O_3) budget and on the formation of the secondary organic aerosols (SOA). Starting from 2013, NO concentration has been measured in the background site climatological station of Mt. Portella (2401 m a.s.l.) in Central Italy. In our analysis, we studied in details some NO plumes events recorded between September and November 2013. Using a single layer feedforward neural network model (FFN), we identified different source of these plumes. For this purpose, we ran the model in different scenarios, changing the model input. We consider the following conditions: 1) all the meteorological parameters (temperature (T), pressure (P), relative humidity (RH), wind speed (Ws), wind direction (Wd), solar radiation(rad)) are included as input for the FFN; 2) only the parameters related to the atmospheric dynamic are considered as input (P, Ws, Wd); 3) only the parameters related to the photochemistry are used as input (T,RH,rad).

The model results in different scenarios will be discussed focusing on the role played by long-medium distance transport on the NO plumes recorded at the Mt. Portella. In order to reinforce our hypothesis, we ran the FFN model adding the O_3 as input to the first and third scenario and, finally, we evaluated the back trajectories using Hysplit, identifying the possible long-medium distance source of the NO peaks depending on transport.